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QUALITY OF LIFE AMONG TUBERCULOSIS PATIENTS WITH AND WITHOUT DIABETES MELLITUS BEFORE AND AFTER ANTI-TB DRUGS ADMINISTRATION

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ABSTRACT

Background : Increased TB prevalence with and without diabetes mellitus affects the quality of life of the patients. Appropriate action on TB patients was needed in health status improvement and quality of life of the patients. SF-36 questionnaire as an instrument to assess the quality of life. **Aim :** To compare Quality of Life (QoL) between TB with diabetes mellitus patients and TB without diabetes mellitus patients before and after the treatment of tuberculosis. **Methods :** A cross-sectional design was performed in this study by collecting data from the medical record of patients in Kariadi Hospital Semarang who were diagnosed with tuberculosis. Research subjects were 44 people with 22 TB with diabetes mellitus patients and 22 TB without diabetes mellitus patients. The direct approach was carried out using the SF-36 questionnaire. The SF-36 questionnaire was filled out using telephone interview. All questions were scored on a scale from 0 to 100, with 100 represents the highest level of function with interpretation the higher the score the higher the level of function, and vice versa. Statistical tests use Wilcoxon Test and Independent Samples T test. **Results :** Wilcoxon test on quality of life of TB patients with and without diabetes mellitus before and after treatment of tuberculosis was significant ($p = 0.0040$). Mean improvement in quality of life difference before and after treatment of tuberculosis in TB without diabetes mellitus patients ($p = 41.72$) was more significant than TB with diabetes mellitus patients ($p = 26.38$). **Conclusion :** There was a significant difference in quality of life between TB with and without diabetes mellitus patients before and after the treatment of tuberculosis as indicated by the SF-36 questionnaire score. TB without diabetes mellitus patients have more significant changes in quality of life compared to TB with diabetes mellitus patients.

Keywords : *Quality of Life, Tuberculosis, Diabetes Mellitus, Anti-TB Drugs, SF-36*

INTRODUCTION

Tuberculosis is an airborne infection caused by *Mycobacterium tuberculosis* and is commonly found in urban areas in densely populated dwellings / environments and spreads through the inhalation of droplet nuclei that enter the airways so that lodged in the lungs forms a primary effect that can arise everywhere in the lungs. Patients with pulmonary TB coughing, sneezing or spitting up the risk of transmitting *Mycobacterium tuberculosis* into the air so that it can infect other people.¹

World Health Organization (WHO) states that TB is exacerbated by the increasing number of people with diabetes

mellitus in the world, which is predicted to reach 592 million by 2030. Diabetics have three times the risk of contracting TB compared to non-diabetics so TB is higher in diabetics than in the general population, and is a common comorbidity in TB sufferers. Diabetes mellitus can worsen over the clinical course of TB, and TB can also worsen glycemic control in diabetics.²

Diabetes mellitus is one of the most important risk factors for TB. In the last few decades, tuberculosis has increasingly become a problem in developing countries, especially insulin-free type 2 diabetes which has emerged as a chronic health condition that continues to increase throughout the



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world.³ The correlation between DM and TB is two-way. Studies have also shown a high prevalence of DM and impaired glucose tolerance in TB patients. Diabetes can increase the risk of becoming infected with *Mycobacterium tuberculosis* through several mechanisms. The mechanisms are directly related to cellular hyperglycemia and insulinopenia or indirect mechanisms for the function of the body's defense cells (macrophages and lymphocytes), which will have an impact on decreasing immunity in the form of disruption of the body's defense cellular response against *Mycobacterium tuberculosis*.²

The increasing prevalence of TB both with and without diabetes mellitus affects the quality of life of patients. DM is a lifelong disease that if not treated with proper care can reduce a person's quality of life. Studies on quality of life in patients with DM show that the overall quality of life is good and their perceptions of health are satisfactory, but patients with DM are still dissatisfied with the psychological side and feel more satisfied when given social support.⁴

Quality of life is defined as an individual's perception of activities in daily life that include physical, psychological, economic, spiritual, and social functions so that they can reflect the impact of disease, morbidity and mortality.⁵ Patients with chronic diseases where mental, social, and physical health factors support the success of treatment so that it is necessary to assess the quality of life of patients with chronic diseases such as TB to recognize appropriate actions in improving the health status and quality of life of patients, one of which is by using the SF-36 questionnaire.⁶

The indicators in the SF-36 questionnaire include physical functioning, role-physical, role-emotional, vitality, social functioning, bodily pain, general health, and mental health which in previous studies no

one has conducted a similar study because the prevalence of TB with and without diabetes mellitus patients in other countries is different from Indonesia, and in Indonesia there is no comparison between those two.⁷ Some TB patients at Kariadi Hospital Semarang often comes back with accompanying complaints after treatment such as chest pain, shortness of breath, and various symptoms that aggravate the patient's condition.

The author tried to find out the comparison of the quality of life of TB with and without diabetes mellitus before and after Anti-TB drugs along with the factors that accompany using the SF-36 questionnaire to be used as input for further research.

METHODS

Selection of subjects and data collection were carried out by recording research variables from the medical records of tuberculosis patients at Kariadi Hospital Semarang from the last year to March 2020. Data were included on tuberculosis patients with and without a history of diabetes mellitus who had been given Anti-TB drugs. Patients phone numbers were obtained from the medical records data. The informed consent form was approved by the patient so that interviews could be carried out indirectly by telephone to the selected subjects to determine the quality of life based on the SF-36 questionnaire provided. The data was collected then recorded and analyzed with statistics.

RESULTS

The sample obtained from this study was 44 samples consisting of 22 TB with diabetes mellitus patients and 22 TB without diabetes mellitus patients with the characteristics of research subjects in table 1.



Table 1. Characteristics of research subjects

Variable	F	%
Gender		
Male	26	59,10
Female	18	40,90
Previous treatment history		
New	38	86,40
Relapse	5	11,40
Treated after failed	1	2,30
HIV		
Positive	1	2,30
Negative	43	97,70
DM		
Yes	22	50,00
No	22	50,00
Treatment adherence		
Regular	39	88,60
Irregular	5	11,40
Weight		
Good	13	29,50
Sufficient	31	70,50
Age		
< 48 years	19	43,20
≥ 48 years	25	56,80
Length of treatment		
≤ 2 months	4	9,10
> 2 months	40	90,90

There were 26 male subjects (59.10%), and 18 female subjects (40.90%). Previous treatment history for new patients as many as 38 people (86.40%), 5 people (11.40%) for relapse patients, 1 person (2.30%) for patients treated after failed. Only 1 person was HIV positive (2.30%),

and 43 others were HIV negative (97.70%). There were 22 TB with diabetes mellitus (50.00%), and 22 others without (50.00%). Level of adherence of patients that regular were 39 people (88.60%), while 5 people (11.40%) for those who were irregular. Body weight in patients who were good or their body weight increased by 13 people (29.50%), and as many as 31 people for patients with sufficient weight or body weight remained (70.50%) after Anti-TB drugs administration. Patients aged <48 years were 19 people (43.20%), while patients aged ≥ 48 years were 25 people (56.80%). Four people were still on treatment for ≤ 2 months, and 40 people were still on treatment for > 2 months.

Mean age of the subjects as a whole was 48 years, with the youngest being 24 years and the oldest being 71 years. The length of treatment data for the study subjects have been chosen 2 months because of intensive phase.

Table 2. Correlation of factors affecting TB with and without diabetes mellitus patients (categoric data)

Variable	TB				p ^C
	DM		Non-DM		
	n	%	n	%	
Gender					
Male	16	72,70	10	45,50	0,066 ^C
Female	6	27,30	12	54,50	
Previous treatment history					
New	16	72,70	22	100	0,031 ^{C*}
Relapse	5	22,70	0	0	
Treated after failed	1	4,50	0	0	
HIV					
Positive	0	0	1	4,50	0,312 ^C
Negative	22	100	21	95,50	
Treatment adherence					
Regular	20	90,90	19	86,40	0,635 ^C
Irregular	2	9,10	3	13,60	
Weight					
Good	9	40,90	4	18,20	0,099 ^C
Sufficient	13	59,10	18	81,80	

*Significant; ^CPearson Chi-Square



Pearson Chi-Square test for previous treatment history correlation was significant ($p = 0.031$) to TB with and without diabetes mellitus patients, while for gender ($p = 0.066$), HIV ($p = 0.312$), the level of adherence treatment ($p = 0.635$), body weight ($p = 0.099$) correlation was not significant to TB with and without diabetes mellitus patients.

Table 3. Correlation of factors affecting TB with and without diabetes mellitus patients (numeric data)

Variable	TB		p^{*m}
	DM	Non-DM	
p			
Age	0,633 [^]	0,114 [^]	0,006 ^{*†}
Length of treatment	0,176 [^]	0,0046	0,001 ^{*m}

*Significant; [†]Independent Samples T test; ^mMann-Whitney U Test

The age data used Independent Samples T test ($p = 0.006$) was significant difference in TB with and without diabetes mellitus, while the data on the length of treatment used Mann-Whitney U test ($p = 0.001$) was also significant difference between TB with and without diabetes mellitus patients.

Measurement of quality of life before and after Anti-TB Drugs administration

The results of measuring the quality of life before and after Anti-TB drugs administration can be observed in table 4.

Table 4. Measurement of quality of life before and after Anti-TB Drugs administration.

Quality of Life	TB	
	DM	Non-DM
p		
Before Anti-TB Drugs Administration	0,007	0,022
	25,57% [¯]	41,01% [¯]
After Anti-TB Drugs Administration	0,363 [^]	0,010
	51,95% [¯]	82,73% [¯]
	0,0039 ^{*m}	0,00 ^{*m}
	0,0040 ^{*w}	0,0040 ^{*w}

*Significant; ^mMann-Whitney U Test; ^wWilcoxon Signed Ranks Test; [¯]Mean

The average quality of life before and after Anti-TB drugs patients increased. The Mann-Whitney U test for quality of life before and after Anti-TB drugs administration was significant difference in TB with diabetes mellitus ($p = 0.0039$) and TB without diabetes mellitus patients ($p = 0.00$). The Wilcoxon Signed Ranks Test to compare the quality of life before and after Anti-TB drugs administration was significant difference in both TB with diabetes mellitus ($p = 0.0040$) and TB without diabetes mellitus patients ($p = 0.0040$) so that quality of life changes could be seen. Better quality of life between TB with and without diabetes mellitus could be seen through the difference in quality of life before and after Anti-TB drugs administration which is listed in table 5.

Table 5. Difference in quality of life before and after Anti-TB drugs administration

p	TB		t
	DM	Non-DM	
Mean	0,358 [^]	0,073 [^]	-4,298 [‡]
	26,38 [‡]	41,72 [‡]	

[‡]Independent Samples T test



Independent Samples T test for the average difference in quality of life before and after Anti-TB drugs administration in TB without diabetes mellitus had a higher average increase (41.72) than TB with diabetes mellitus patients (26.38) or it could be seen from the negative results ($t = -4,298$) which stated that TB without diabetes mellitus patients have a higher average difference in quality of life than TB with diabetes mellitus patients and could be specifically seen in each domain of quality of life in table 6.

Table 6. Difference in quality of life domain before and after Anti-TB Drugs administration

Variable	TB		$p^{\dagger m}$
	DM	Non-DM	
	p		
Physical functioning	0,0035	0,447 [^]	0,001 ^{*m}
Role-physical	0,0028	0,0088	0,127 ^m
Role-emotional	0,003	0,0003	0,162 ^m
Vitality	0,115 [^]	0,571 [^]	0,003 ^{*†}
Mental health	0,091 [^]	0,025	0,343 ^m
Social functioning	0,0043	0,021	0,0099 ^{*m}
Bodily pain	0,038	0,142 [^]	0,111 ^m
General health	0,276 [^]	0,139 [^]	0,0043 ^{*†}

*Significant; [†]Independent Samples T test; ^mMann Whitney U Test

The difference in the domain of quality of life for physical functioning ($p = 0.001$), vitality ($p = 0.003$), social functioning ($p = 0.0099$), and general health ($p = 0.0043$) were significant difference in quality of life before and Anti-TB drugs administration. The difference in the quality of life domain for the role-physical ($p = 0.127$), role-emotional ($p = 0.162$), mental health ($p = 0.343$), and the bodily pain ($p = 0.111$) were not significant difference in quality of life before and after Anti-TB drugs administration.

Correlation between the factors affecting the difference in quality of life before and after Anti-TB Drugs administration

The correlation of factors affecting the difference in quality of life before and after Anti-TB drugs administration can be seen in table 7 and table 8.

Table 7. Correlation between the factors affecting the difference in quality of life before and after Anti-TB Drugs administration (categoric data)

Variable	p	p^{\square}
Age	0,112 [^]	0,059 ^{\square}
Length of treatment	0,0074	0,354 ^{\square}
Difference in quality of life before and after Anti-TB Drugs Administration	0,006	-

^KKruskal Wallis Test

Kruskal Wallis test in previous treatment history ($p = 0.559$) was not significant difference in quality of life before and after Anti-TB drugs administration.

Table 8. Correlation between the factors that affecting the difference in quality of life before and after Anti-TB drugs administration (numeric data)

Variable	p	$p^{\#}$
Previous treatment history		
New	0,027 [^]	0,559 ^{\#}
Relapse	0,234	
Treated after failed	-	

^{\square}Spearman Correlation

In Spearman Correlation test, age ($p = 0.059$) and length of treatment ($p = 0.354$) were not significant difference in quality of life before and after Anti-TB drugs



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administration so that multivariate analysis was not carried out.

DISCUSSION

The quality of life before and after Anti-TB drugs administration was significant difference ($p = 0.0040$) in both TB with and without diabetes mellitus patients. The difference in quality of life before and after Anti-TB drugs administration that TB without diabetes mellitus patients have a higher average increase (41.72) than TB with diabetes mellitus patients (26.38) or it could also be seen from the negative results ($t = -4.298$) that TB without diabetes mellitus patients have a higher average difference in quality of life. These results are in line with studies which suggest that a person with chronic diseases such as diabetes, then also has other diseases or comorbidities such as TB, which can make their health condition worse and lower quality of life score.⁴ Another study stated that before treatment, the overall life-domain scores of tuberculosis patients were lower than controls ($p < 0.05$). Patient scores improved significantly after two months of treatment ($p = 0.01$), but the difference was not significant between two and six months after treatment ($p = 0.07$).⁸

The difference in the quality of life domain of physical function ($p = 0.001$), vitality ($p = 0.003$), social function ($p = 0.0099$), and general health ($p = 0.0043$) were significant differences before and after Anti-TB drugs administration. The difference in the quality of life domain for role-physical ($p = 0.127$), role-emotional ($p = 0.162$), mental health ($p = 0.343$), and bodily pain ($p = 0.111$) were not significant difference in quality of life before and after Anti-TB drugs administration. Mean of SF-36 domain score have reported in previous case studies, even after starting TB treatment, Physical Component Score (PCS)

gave more effects than Mental Component Score (MCS).^{9,10}

Physical functioning was significant difference in quality of life before and after Anti-TB drugs administration because before treatment patients felt difficult to do activities, but after it patients could do activities again with a decrease in TB symptoms. Previous studies have reported that persistent symptoms in TB patients negatively impact quality of life during various phase of treatment and after completion of treatment because TB destroys lung tissue causing persistence of symptoms even after treatment is completed.¹⁰ Another study revealed that quality of life score less than 47 in Physical Component Score was obtained at the start of treatment, but after treatment the score increased markedly at the end of the intensive phase. Only PCS at the end of treatment showed a significant score increase of more than 47 for all TB patients, giving the impression that TB treatment improved the physical condition of TB patients.¹¹

Vitality was significant difference in quality of life before and after Anti-TB drugs administration because before treatment patients feel tired easily and have a little energy to do activities, but after it patients rarely feel tired. Previous studies suggested that the level of education may play a role in increasing vitality because education generates additional flexibility in life and motivates self-care leading to decreased physical problems and increased vitality.¹² The increase in vitality may be due to the replenishment of energy caused by TB treatment.¹³

Social functioning was significant difference in quality of life before and after Anti-TB drugs administration because before treatment patients decided to rest at home because TB was potentially contagious, but after it patients were more



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confident to leave the house by continuing to carry out health protocols and more interact with the people around the patients. Similar results were found in other studies that TB could have an impact on social functioning because the social stigma associated with patients demonstrated by a TB diagnosis associated with changes in family life and social environment leads to a negative impact on patients' quality of life. The social isolation associated with TB and the burden of treatment in turn has an impact on the quality of life regarding the patient's health.¹⁴

General health was significant difference in quality of life before and after Anti-TB drugs administration because before treatment patients did not feel healthier than other people and felt easily sick, but after it patients felt healthier like others and in good health. The quality of life scores on general health in this study, although significant, it had the lowest score compared to other domains. This result was similar to the previous study which stated that the lowest score was observed in the WHOQOL-100 general health for TB patients in Turkey.¹⁵ Other studies conducted on TB patients in Indonesia that fifty-one percent of participants were either dissatisfied or very dissatisfied with their general health.¹⁶

Previous treatment history ($p = 0.559$) was not significant difference in quality of life before and after Anti-TB drugs administration. Age ($p = 0.059$) and length of treatment ($p = 0.354$) were also not significant difference, so these three variables were not confounding variables in patients' quality of life before and after Anti-TB drugs administration.

CONCLUSION AND SUGGESTION

Conclusion

There was a change in the quality of life in TB with diabetes mellitus patients

before and after Anti-TB drugs administration. There was also a change in the quality of life in TB without diabetes mellitus patients before and after Anti-TB drugs administration. Anti-TB drugs administration can cause changes in quality of life as indicated by the SF-36 questionnaire score after Anti-TB drugs administration is higher than before. TB without diabetes mellitus patients showed more significant changes in quality of life than TB with diabetes mellitus patients.

Suggestion

It is necessary to conduct research with a cohort study in order to obtain a relationship between one or more factors that affect the quality of life so it can have an impact on TB with and without diabetes mellitus patients. It is necessary to homogenize the sample in intensive phase so the data which is not retrospective can be obtained. It is necessary to control massive confounding variables both in TB with and without diabetes mellitus patients in order to support the better patient's quality of life.

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